FIG. 1

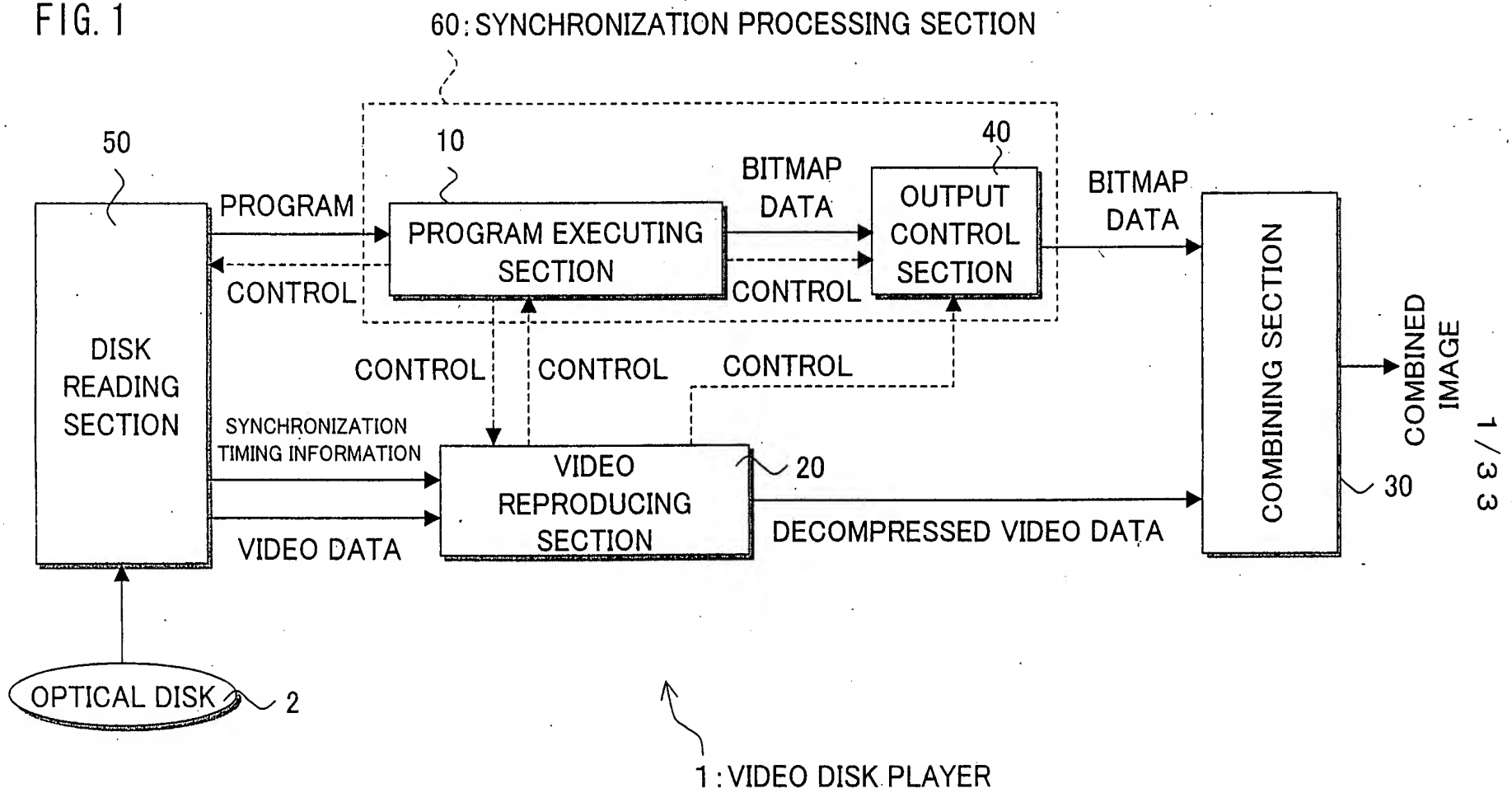

60 : SYNCHRONIZATION PROCESSING SECTION
50
10
40
PROGRAM
PROGRAM EXECUTING SECTION
BITMAP DATA
OUTPUT CONTROL SECTION
BITMAP DATA
CONTROL
CONTROL
DISK READING SECTION
CONTROL
CONTROL
CONTROL
SYNCHRONIZATION TIMING INFORMATION
VIDEO REPRODUCING SECTION
20
COMBINING SECTION
COMBINED IMAGE
30
VIDEO DATA
DECOMPRESSED VIDEO DATA
OPTICAL DISK
2
1 : VIDEO DISK PLAYER

FIG. 2

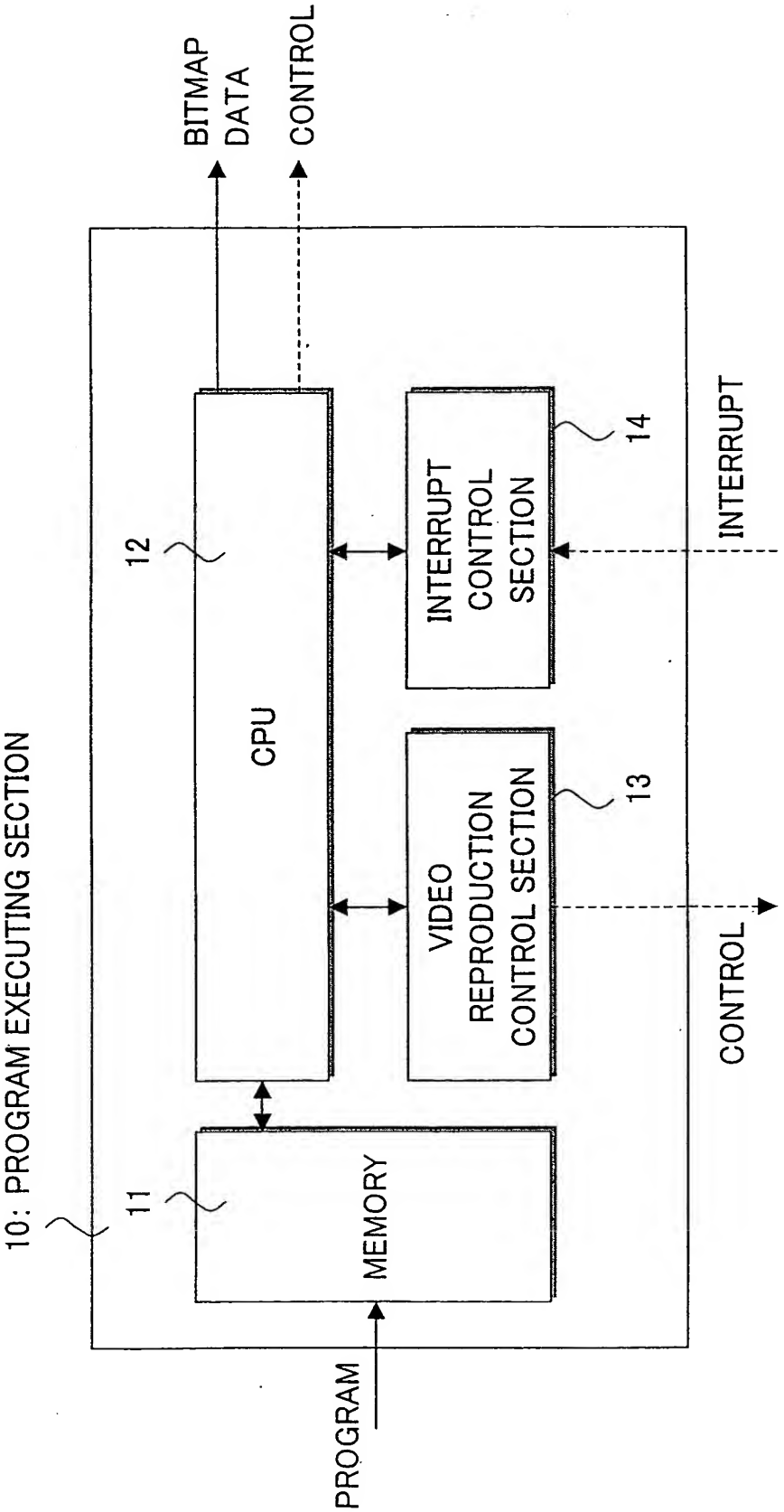

10: PROGRAM EXECUTING SECTION
11
MEMORY
12
CPU
13
VIDEO REPRODUCTION CONTROL SECTION
14
INTERRUPT CONTROL SECTION
PROGRAM
BITMAP DATA
CONTROL
INTERRUPT
CONTROL

FIG. 3

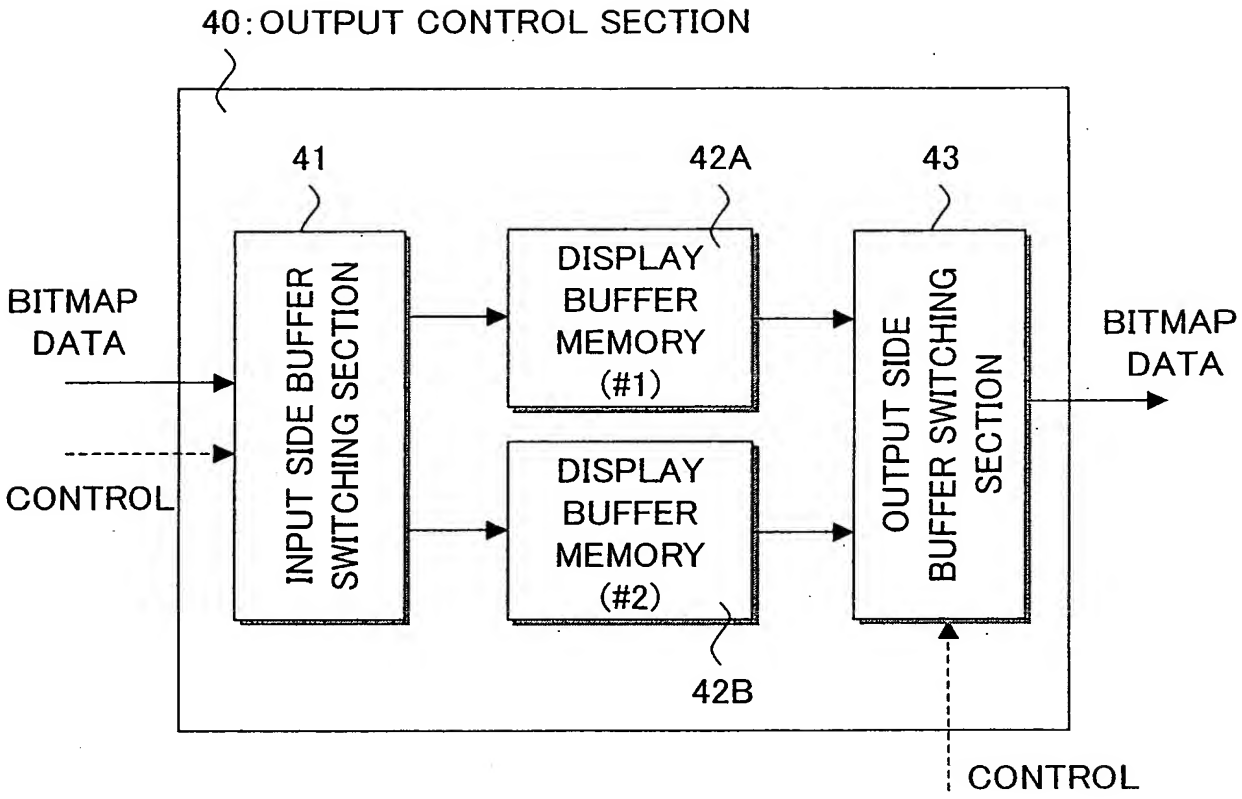

40:OUTPUT CONTROL SECTION
41
42A
43
BITMAP DATA
CONTROL
INPUT SIDE BUFFER SWITCHING SECTION
DISPLAY BUFFER MEMORY (#1)
DISPLAY BUFFER MEMORY (#2)
OUTPUT SIDE BUFFER SWITCHING SECTION
BITMAP DATA
42B
CONTROL

FIG. 4

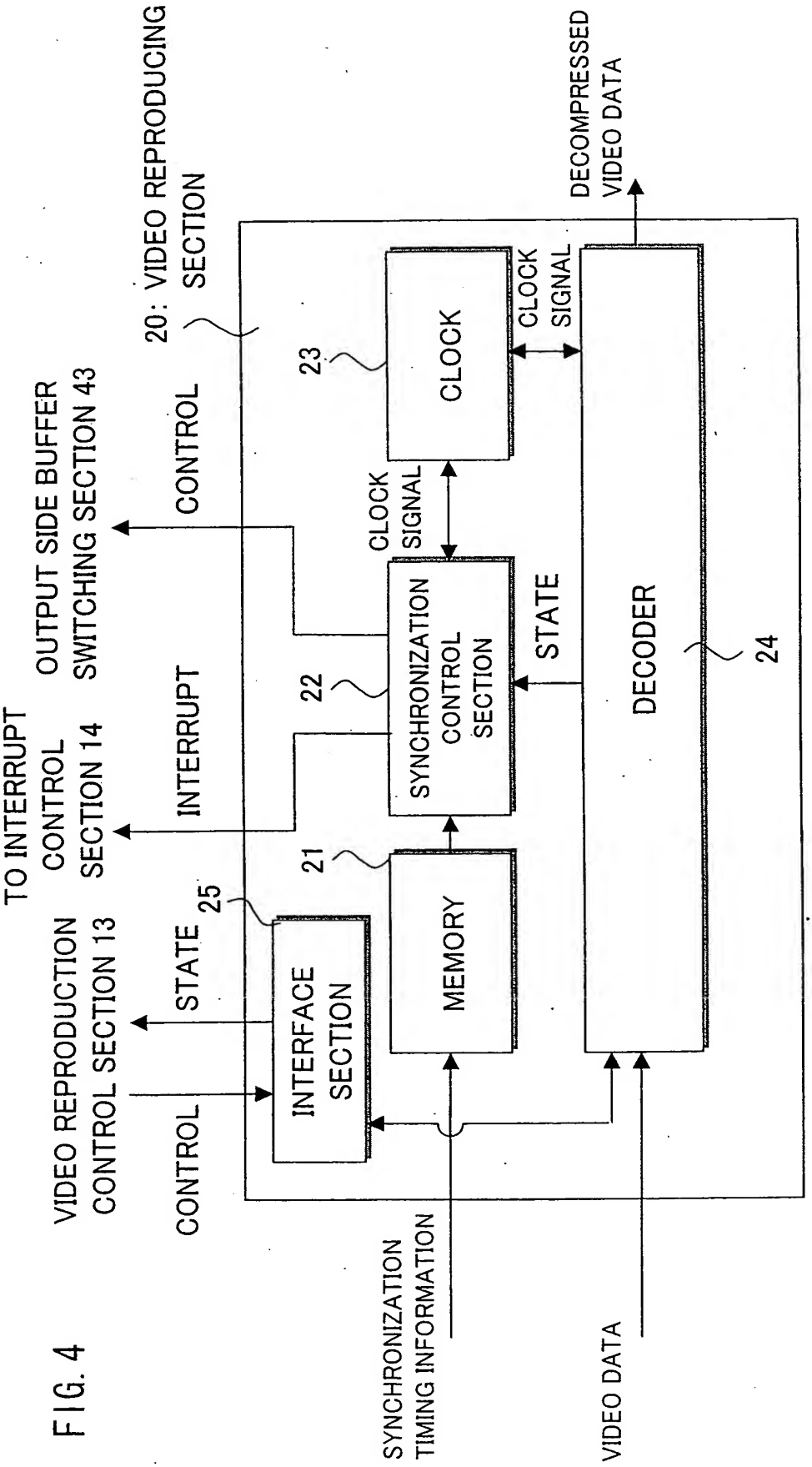

20: VIDEO REPRODUCING SECTION
OUTPUT SIDE BUFFER SWITCHING SECTION 43
TO INTERRUPT CONTROL SECTION 14
VIDEO REPRODUCTION CONTROL SECTION 13
CONTROL
STATE
INTERRUPT
CONTROL
25
21
22
23
INTERFACE SECTION
MEMORY
SYNCHRONIZATION CONTROL SECTION
CLOCK
CLOCK SIGNAL
CLOCK SIGNAL
STATE
DECODER
24
DECOMPRESSED VIDEO DATA
SYNCHRONIZATION TIMING INFORMATION
VIDEO DATA

FIG. 5(a)

```
SYNCHRONIZATION TIMING INFORMATION {
        number_of_sync_info;
        for (i=0; i < number_of_sync_info; i++){
                sync_info();
        }
}
```

FIG. 5(b)

```
sync_info() {
        timing;
        target;
        action_id;
}
```

FIG. 6

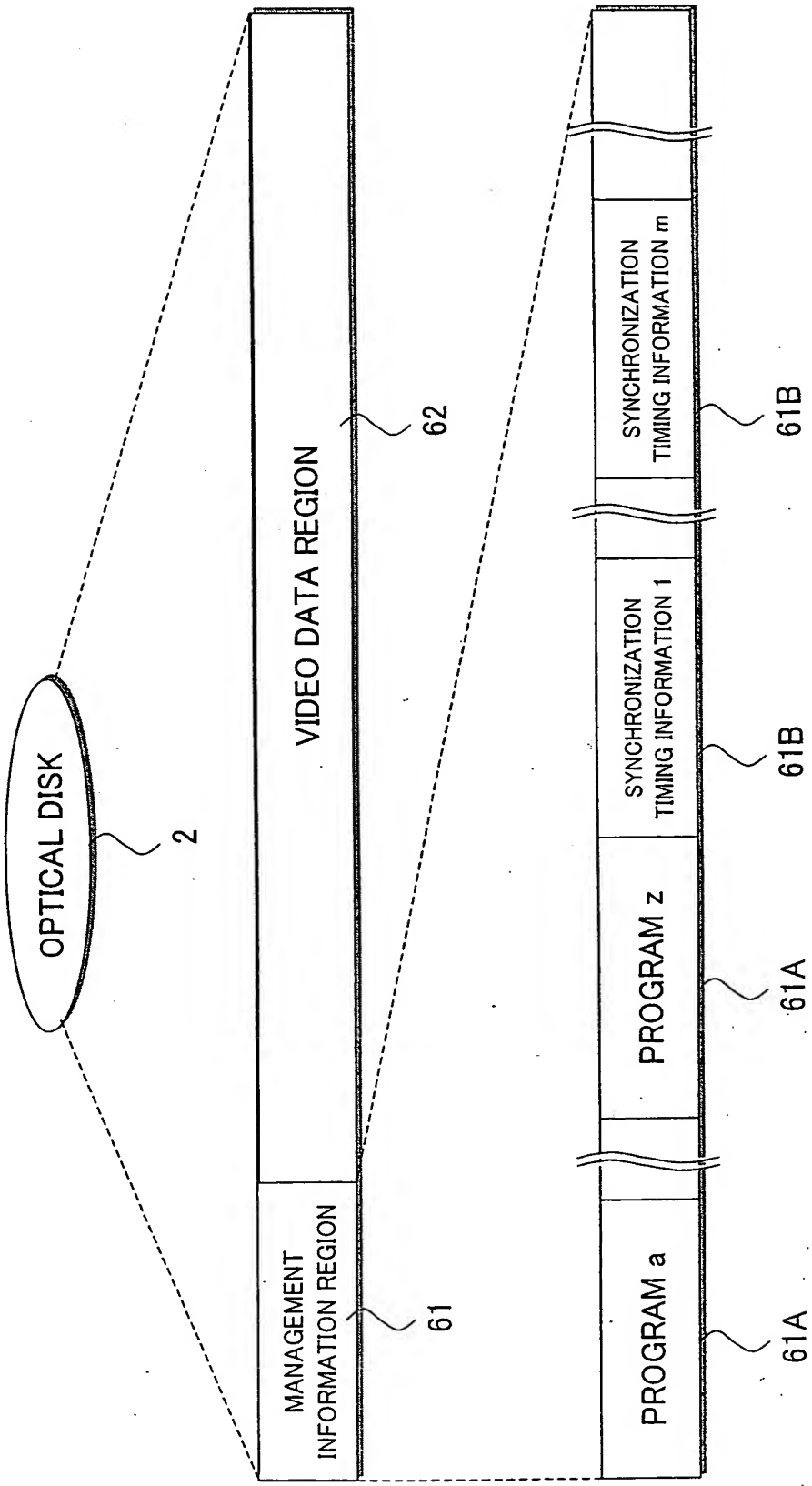

OPTICAL DISK
2
VIDEO DATA REGION
62
MANAGEMENT INFORMATION REGION
61
PROGRAM a
61A
PROGRAM z
61A
SYNCHRONIZATION TIMING INFORMATION 1
61B
SYNCHRONIZATION TIMING INFORMATION m
61B

FIG. 7

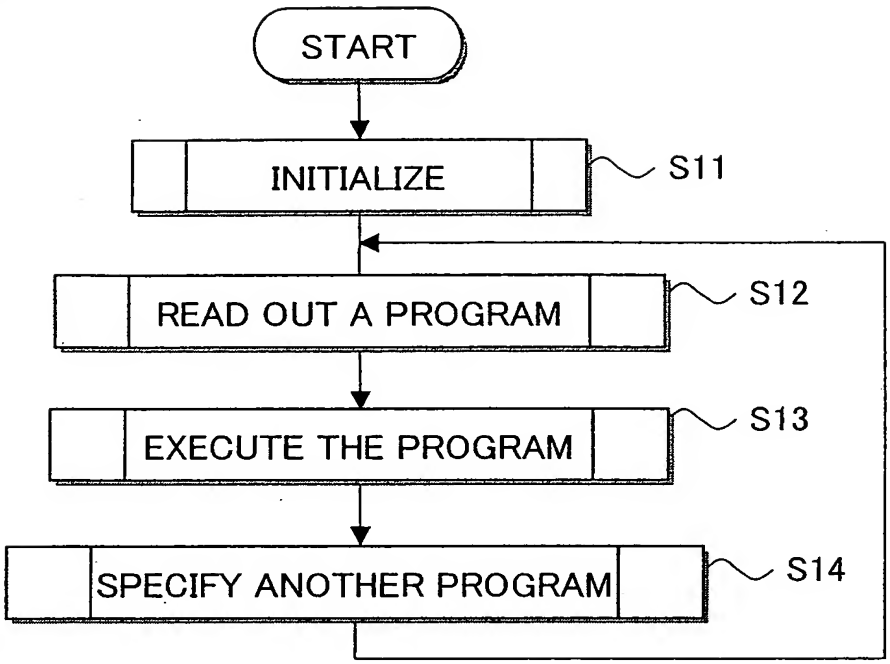

START
INITIALIZE
S11
READ OUT A PROGRAM
S12
EXECUTE THE PROGRAM
S13
SPECIFY ANOTHER PROGRAM
S14

FIG. 8

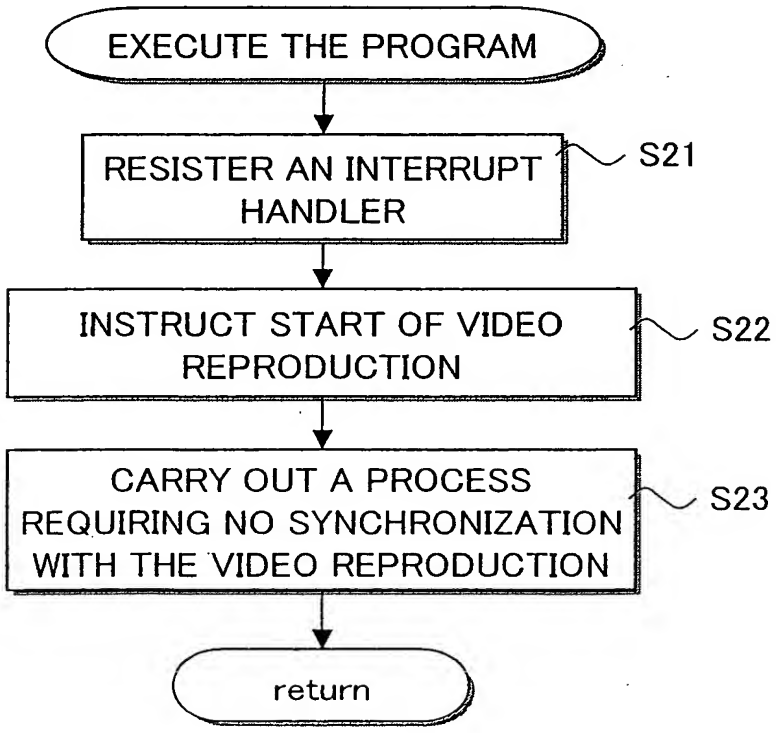

EXECUTE THE PROGRAM
RESISTER AN INTERRUPT HANDLER
S21
INSTRUCT START OF VIDEO REPRODUCTION
S22
CARRY OUT A PROCESS REQUIRING NO SYNCHRONIZATION WITH THE VIDEO REPRODUCTION
S23
return

FIG. 9

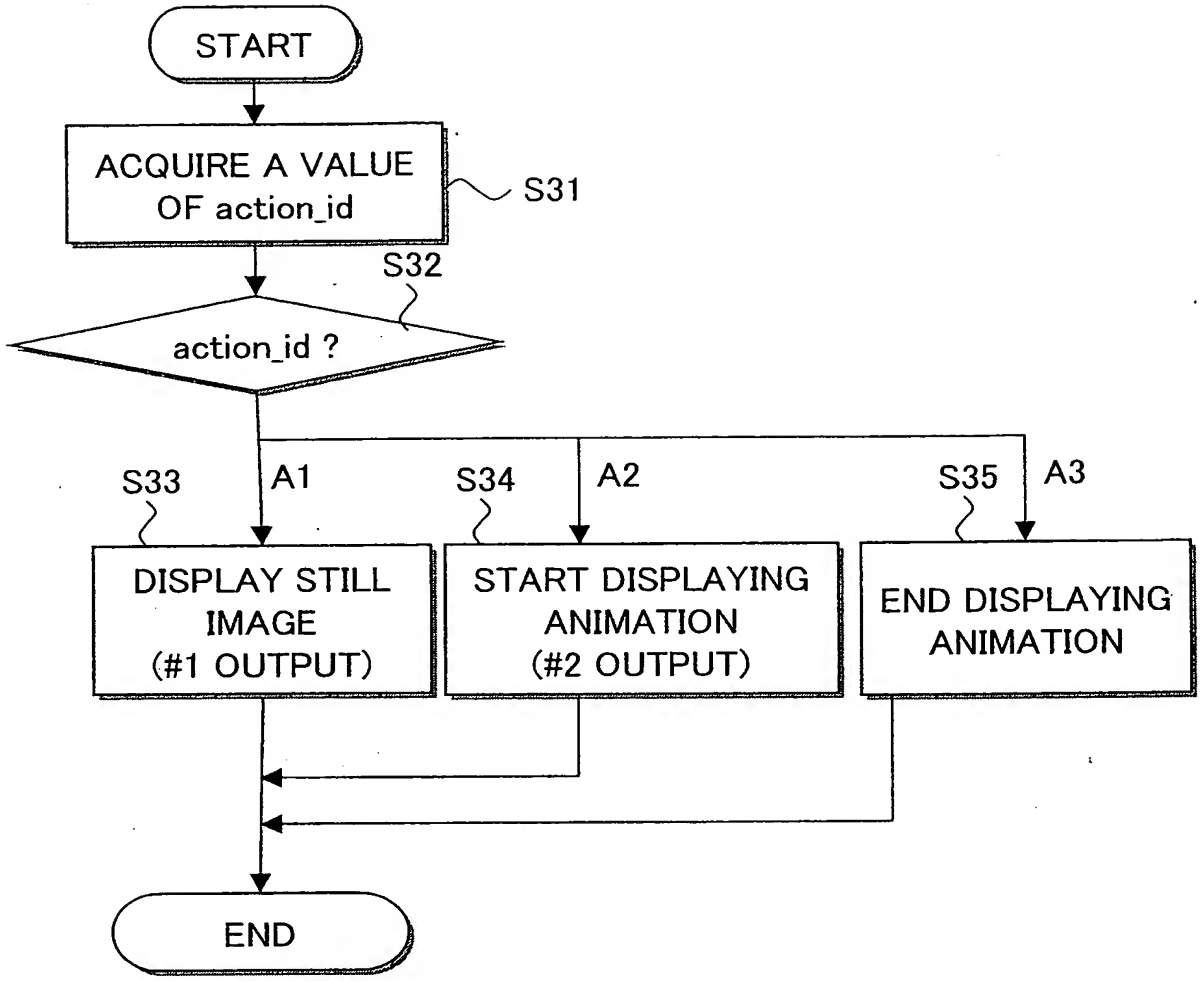


FIG. 10

entry no	timing	target	action_id
1	T1	PROGRAM EXECUTING SECTION	A1
2	T2	OUTPUT CONTROL SECTION	SWITCH TO DISPLAY BUFFER MEMORY #1
3	T3	PROGRAM EXECUTING SECTION	A2
4	T4	OUTPUT CONTROL SECTION	SWITCH TO DISPLAY BUFFER MEMORY #2
5	T5	OUTPUT CONTROL SECTION	END OUTPUTTING
5	T6	PROGRAM EXECUTING SECTION	A3

FIG. 11

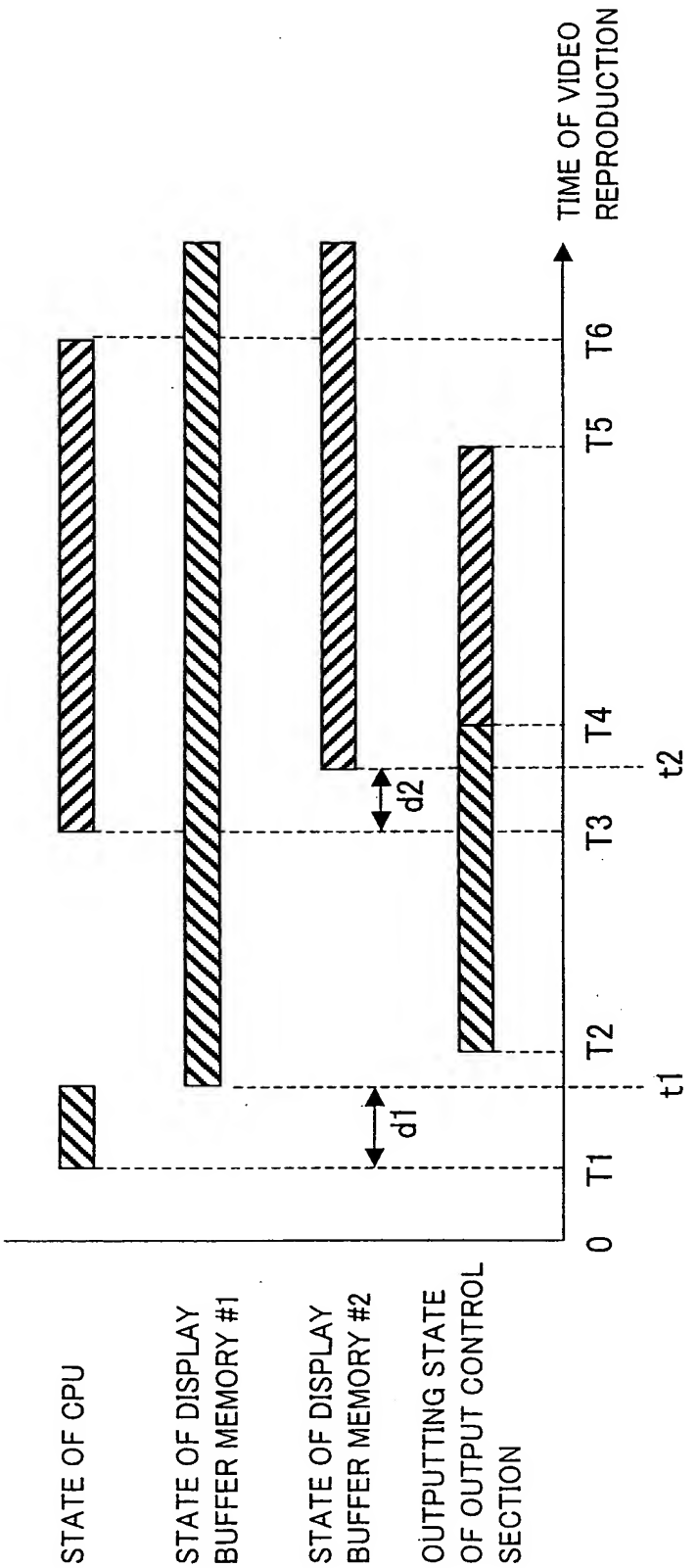

STATE OF CPU
STATE OF DISPLAY BUFFER MEMORY #1
STATE OF DISPLAY BUFFER MEMORY #2
OUTPUTTING STATE OF OUTPUT CONTROL SECTION
0
T1
T2
T3
T4
T5
T6
t1
t2
d1
d2
TIME OF VIDEO REPRODUCTION

FIG. 12(a)

```
SYNCHRONIZATION TIMING INFORMATION {
        number_of_sync_info;
        for (i=0; i < number_of_sync_info; i++){
                sync_info();
        }
}
```

FIG. 12(b)

```
sync_info() {
        timing;
        target;
        action_id;
        independent_flag;
        merged_flag;
}
```

FIG. 13(a)

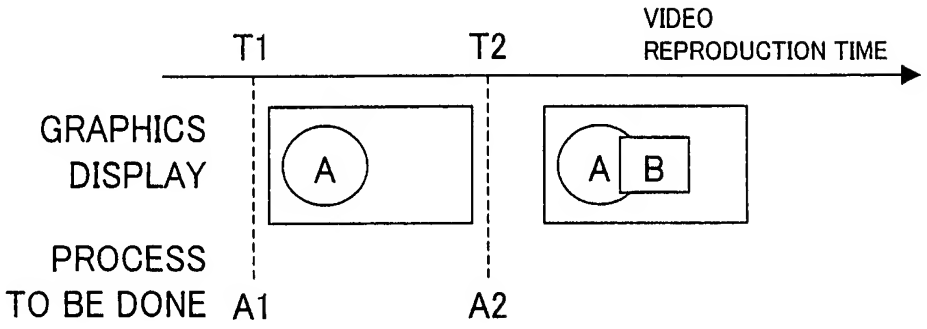


FIG. 13(b)

entry no	timing	action_id	independent_flag
1	T1	A1 (DRAW GRAPHICS A)	1
2	T2	A2 (DRAW GRAPHICS B)	0

FIG. 13(c)

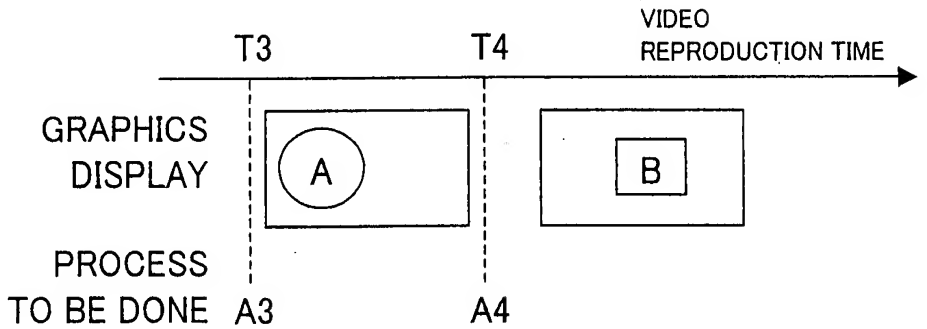


FIG. 13(d)

entry no	timing	action_id	independent_flag
1	T3	A3 (DRAW GRAPHICS A)	1
2	T4	A4 (DRAW GRAPHICS B AFTER CANCELING THE DISPLAY)	1

FIG. 14(a)

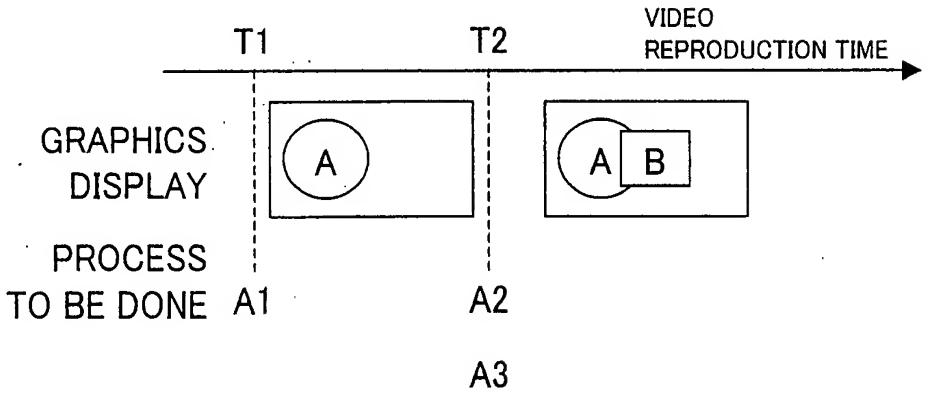


FIG. 14(b)

entry no	timing	action_id	merged_flag
1	T1	A1 ((DRAW GRAPHICS A)	0
2	T2	A2 (DRAW GRAPHICS B)	0
3	T2	A3 (DRAW GRAPHICS A AND GRAPHICS B)	1

FIG. 15

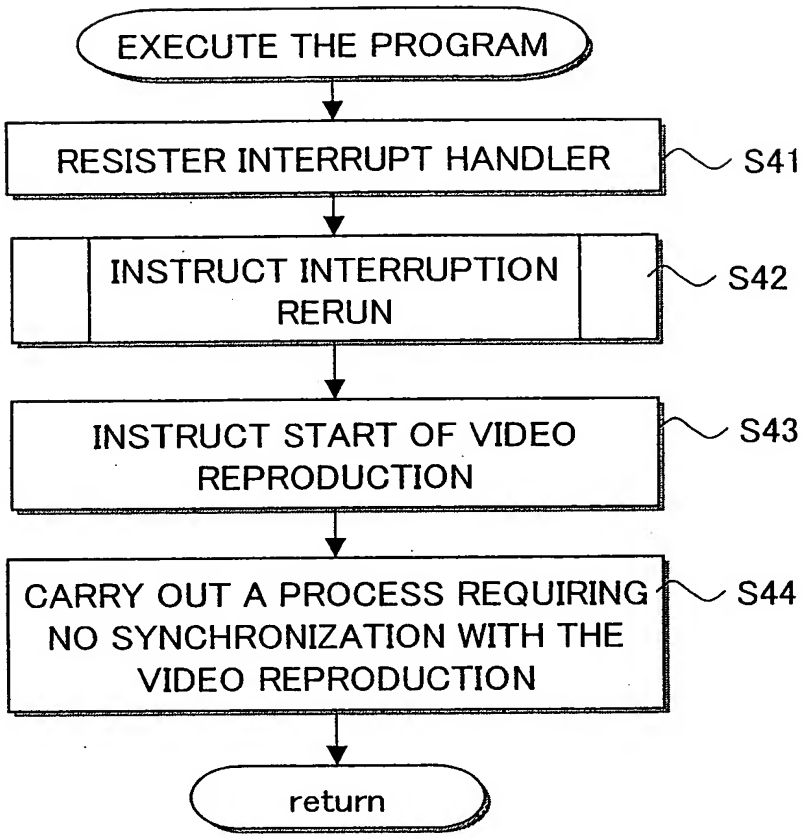

EXECUTE THE PROGRAM
RESISTER INTERRUPT HANDLER
S41
INSTRUCT INTERRUPTION RERUN
S42
INSTRUCT START OF VIDEO REPRODUCTION
S43
CARRY OUT A PROCESS REQUIRING NO SYNCHRONIZATION WITH THE VIDEO REPRODUCTION
S44
return

FIG. 16

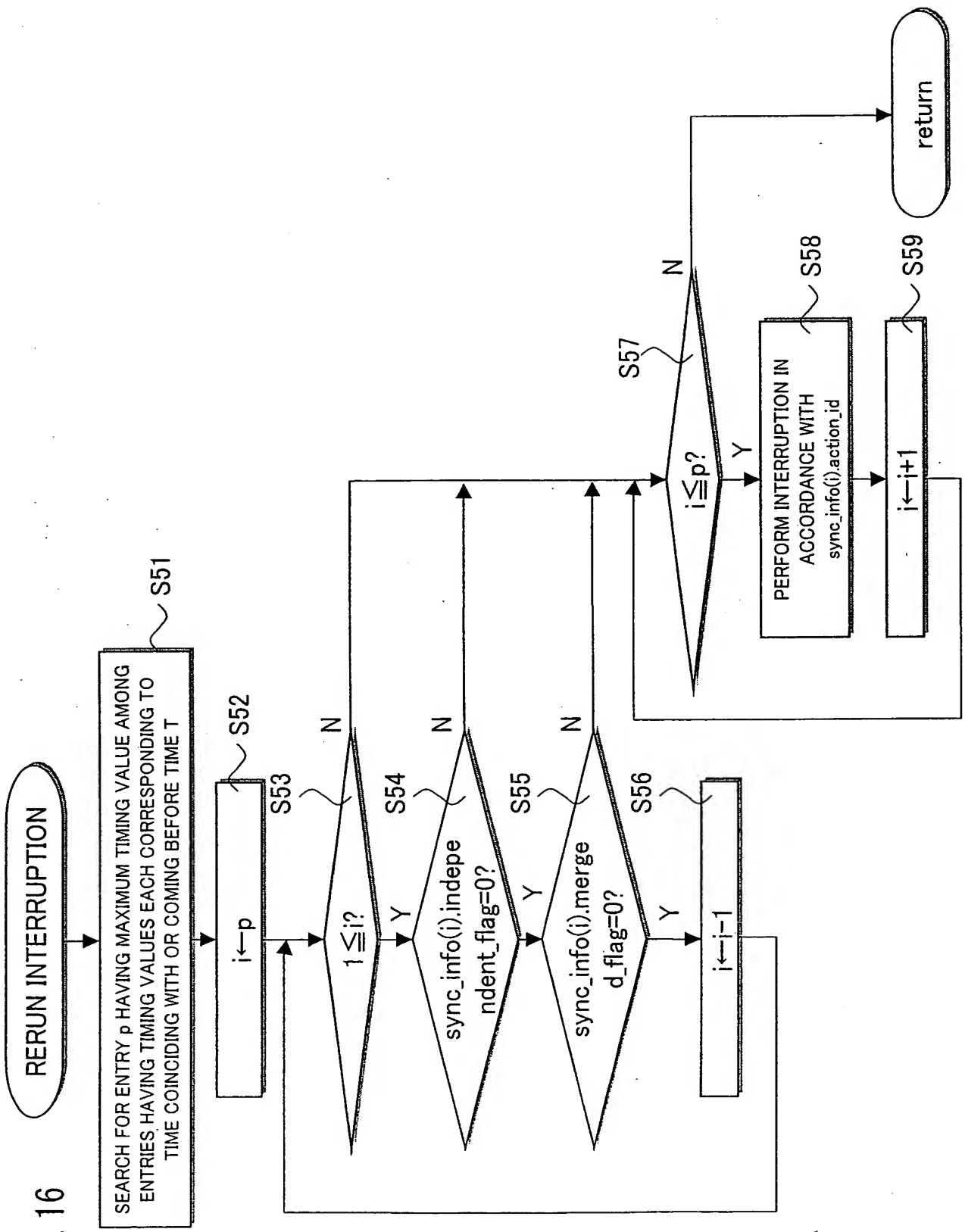

RERUN INTERRUPTION
SEARCH FOR ENTRY p HAVING MAXIMUM TIMING VALUE AMONG ENTRIES HAVING TIMING VALUES EACH CORRESPONDING TO TIME COINCIDING WITH OR COMING BEFORE TIME T
S51
i←p
S52
1≦i?
S53
sync_info(i).independent_flag=0?
S54
sync_info(i).merged_flag=0?
S55
i←i-1
S56
i≦p?
S57
PERFORM INTERRUPTION IN ACCORDANCE WITH sync_info(i).action_id
S58
i←i+1
S59
return
Y
N

FIG. 17

entry no	timing	action_id	independent_ flag	merged_ flag
1	T1	A1 (DRAW GRAPHICS A AT COORDINATE x)	1	0
2	T2	A2 (RELOCATE GRAPHICS A TO COORDINATE y)	0	0
3	T2	A3 (DRAW GRAPHICS A TO COORDINATE y)	0	1
4	T3	A4 (CANCEL DISPLAY AND DRAW GRAPHICS C AT COORDINATE z)	1	0
5	T4	A5 (DRAW GRAPHICS D AT COORDINATE w)	0	0

FIG. 18(a)

```
sync_info() {
        timing;
        target;
        action_id;
        condition();
}
```

FIG. 18(b)

```
condition() {
        normal;
        FF;
        FR;
        SF;
        SR;
}
```

FIG. 19

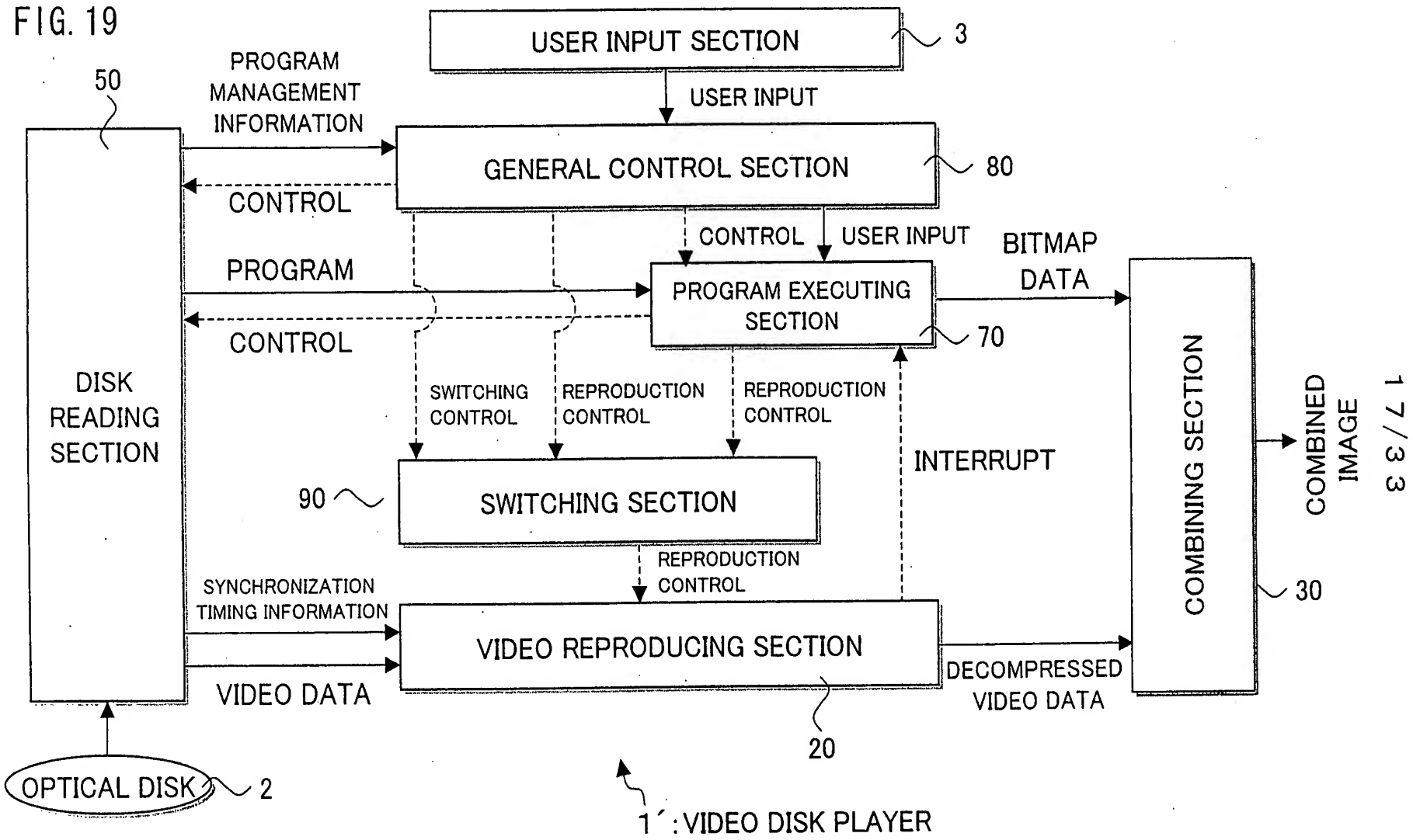

USER INPUT SECTION
3
USER INPUT
50
PROGRAM MANAGEMENT INFORMATION
GENERAL CONTROL SECTION
80
CONTROL
CONTROL
USER INPUT
BITMAP DATA
PROGRAM
PROGRAM EXECUTING SECTION
70
CONTROL
DISK READING SECTION
SWITCHING CONTROL
REPRODUCTION CONTROL
REPRODUCTION CONTROL
INTERRUPT
COMBINING SECTION
COMBINED IMAGE
90
SWITCHING SECTION
REPRODUCTION CONTROL
SYNCHRONIZATION TIMING INFORMATION
30
VIDEO REPRODUCING SECTION
DECOMPRESSED VIDEO DATA
VIDEO DATA
20
OPTICAL DISK
2
1´: VIDEO DISK PLAYER

FIG. 20

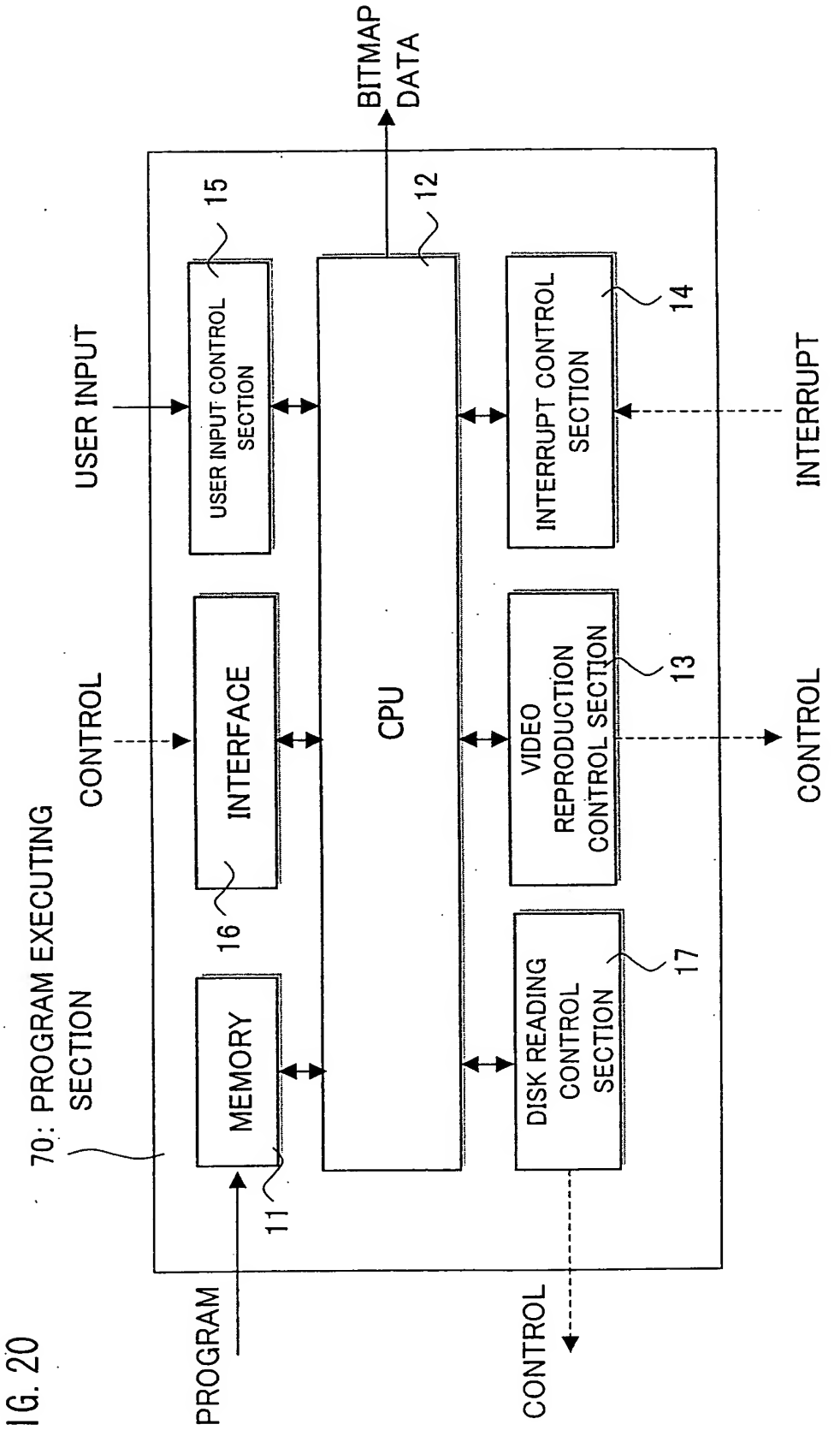

BITMAP DATA
USER INPUT
CONTROL
70: PROGRAM EXECUTING SECTION
PROGRAM
CONTROL
INTERRUPT
CONTROL
USER INPUT CONTROL SECTION
INTERFACE
MEMORY
CPU
INTERRUPT CONTROL SECTION
VIDEO REPRODUCTION CONTROL SECTION
DISK READING CONTROL SECTION
11
12
13
14
15
16
17

FIG. 21

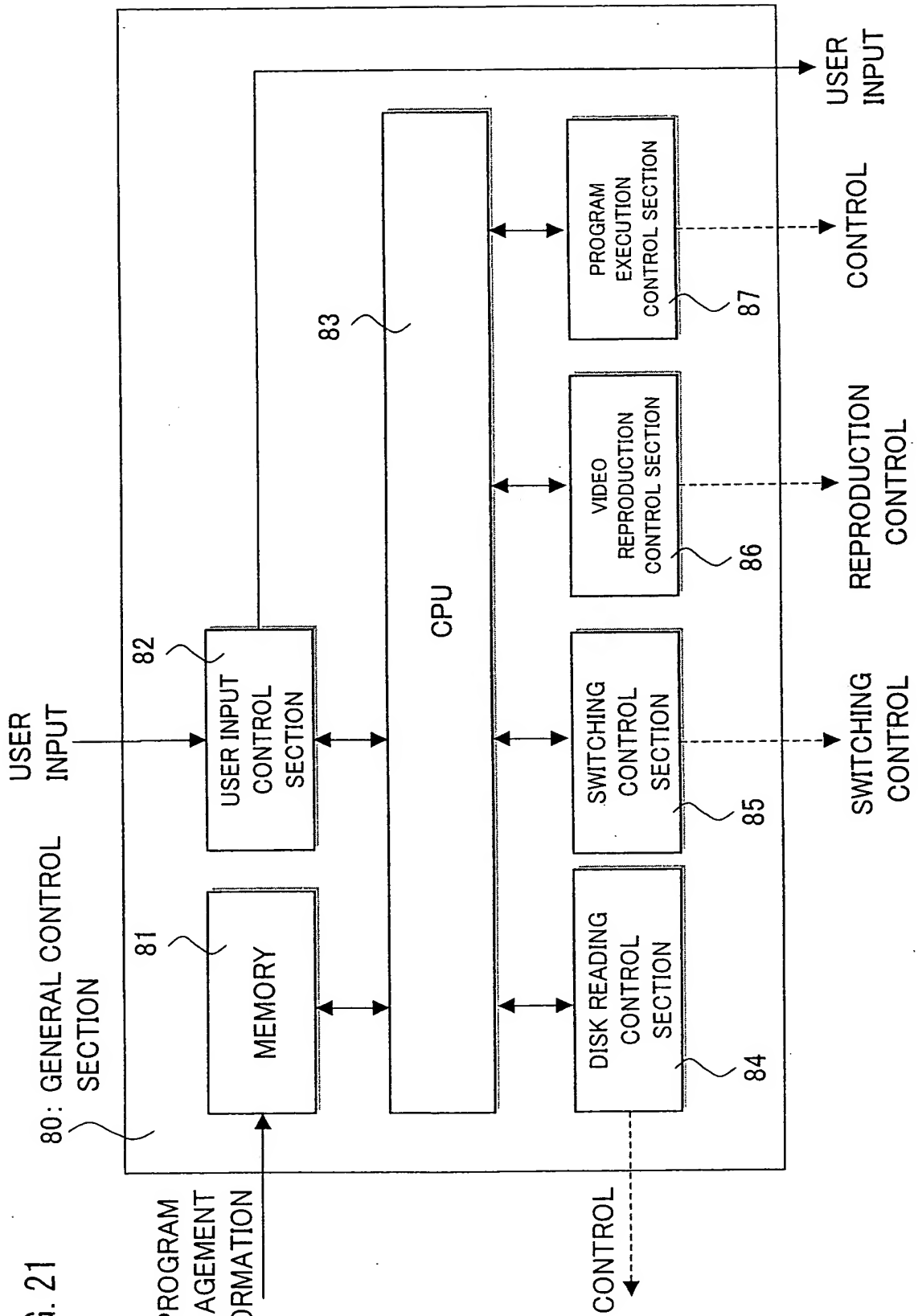

80: GENERAL CONTROL SECTION
USER INPUT
PROGRAM MANAGEMENT INFORMATION
CONTROL
USER INPUT
CONTROL
REPRODUCTION CONTROL
SWITCHING CONTROL
82
USER INPUT CONTROL SECTION
81
MEMORY
83
CPU
84
DISK READING CONTROL SECTION
85
SWITCHING CONTROL SECTION
86
VIDEO REPRODUCTION CONTROL SECTION
87
PROGRAM EXECUTION CONTROL SECTION

FIG. 22 (a)

```
PROGRAM MANAGEMENT TABLE {
        number_of_pmi;
        for (i=0; I < number_of_pmi){
                PROGRAM MANAGEMENT INFORMATION ()
        }
}
```

FIG. 22 (b)

```
PROGRAM MANAGEMENT INFORMATION() {
        program_file_name;
        playback_control_mode;
        is_video_specified;
        if( is_video_specified == 1 ){
                video_file_name;
                start_mode;
        }
        menu_flag;
        resume_flag;
}
```

FIG. 23

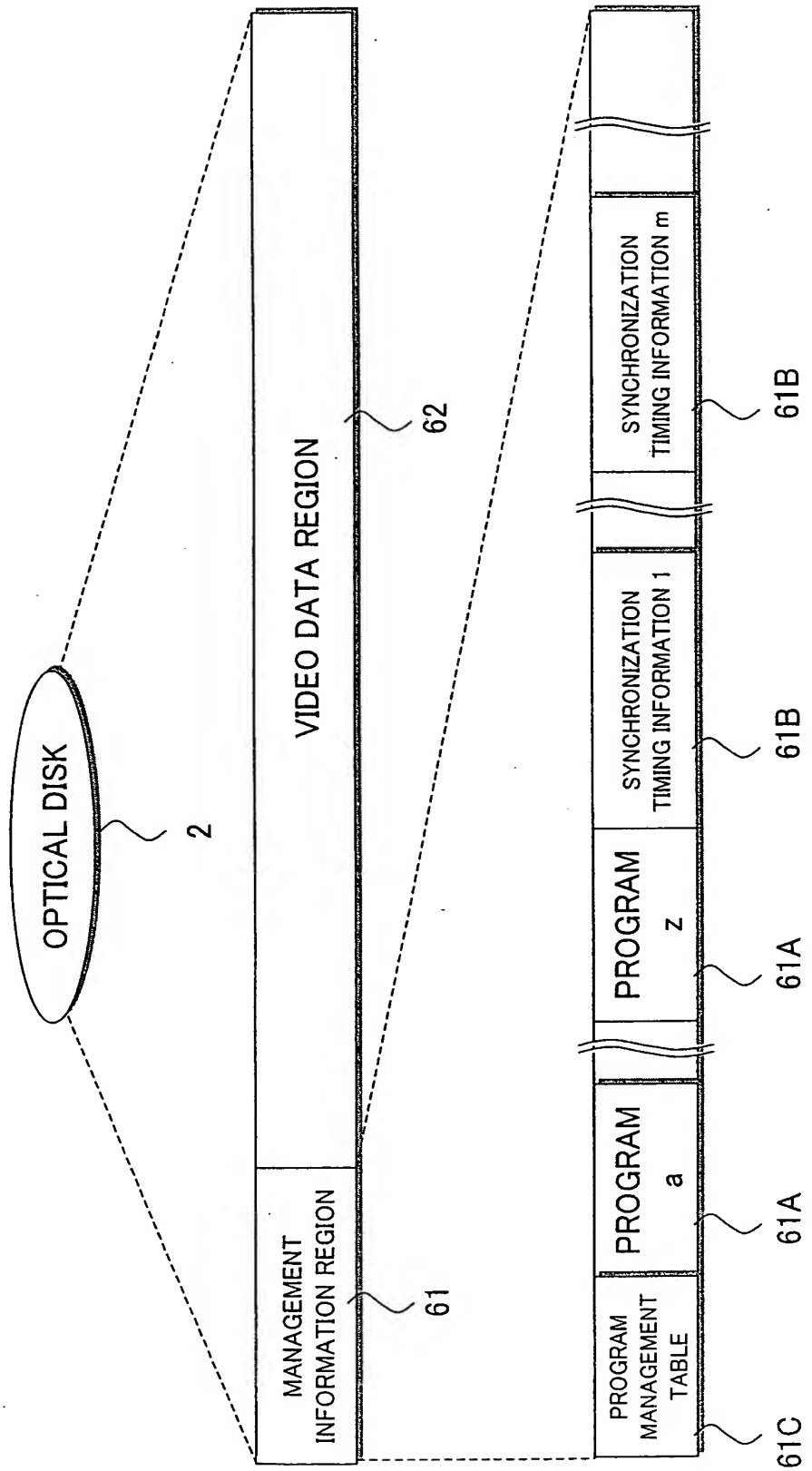

OPTICAL DISK
2
VIDEO DATA REGION
62
MANAGEMENT INFORMATION REGION
61
PROGRAM MANAGEMENT TABLE
61C
PROGRAM a
61A
PROGRAM z
61A
SYNCHRONIZATION TIMING INFORMATION 1
61B
SYNCHRONIZATION TIMING INFORMATION m
61B

FIG. 24

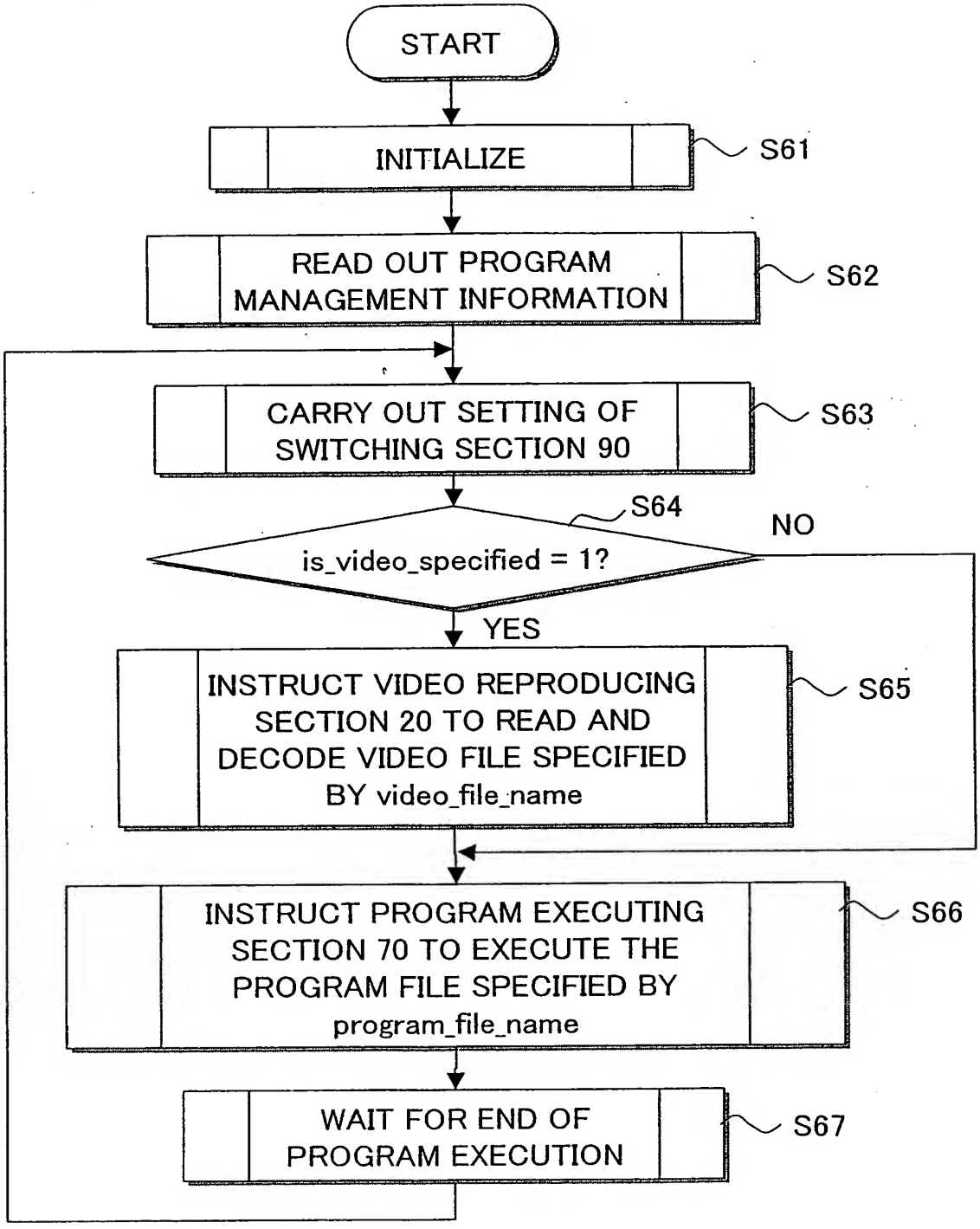

START
INITIALIZE
S61
READ OUT PROGRAM MANAGEMENT INFORMATION
S62
CARRY OUT SETTING OF SWITCHING SECTION 90
S63
S64
is_video_specified = 1?
NO
YES
INSTRUCT VIDEO REPRODUCING SECTION 20 TO READ AND DECODE VIDEO FILE SPECIFIED BY video_file_name
S65
INSTRUCT PROGRAM EXECUTING SECTION 70 TO EXECUTE THE PROGRAM FILE SPECIFIED BY program_file_name
S66
WAIT FOR END OF PROGRAM EXECUTION
S67

FIG. 25

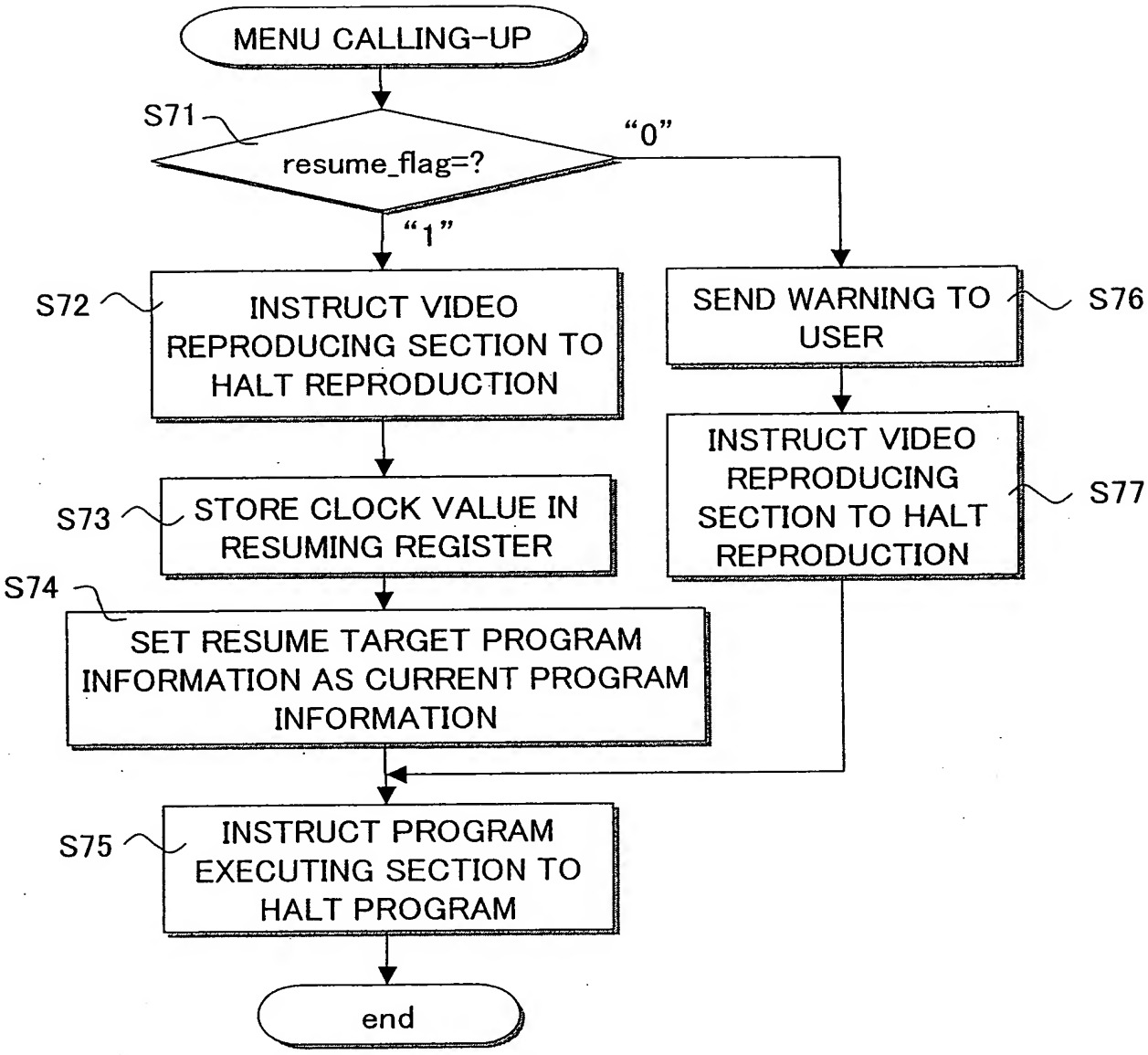

MENU CALLING-UP
S71
resume_flag=?
"0"
"1"
S72
INSTRUCT VIDEO REPRODUCING SECTION TO HALT REPRODUCTION
S73
STORE CLOCK VALUE IN RESUMING REGISTER
S74
SET RESUME TARGET PROGRAM INFORMATION AS CURRENT PROGRAM INFORMATION
S75
INSTRUCT PROGRAM EXECUTING SECTION TO HALT PROGRAM
end
SEND WARNING TO USER
S76
INSTRUCT VIDEO REPRODUCING SECTION TO HALT REPRODUCTION
S77

FIG. 26

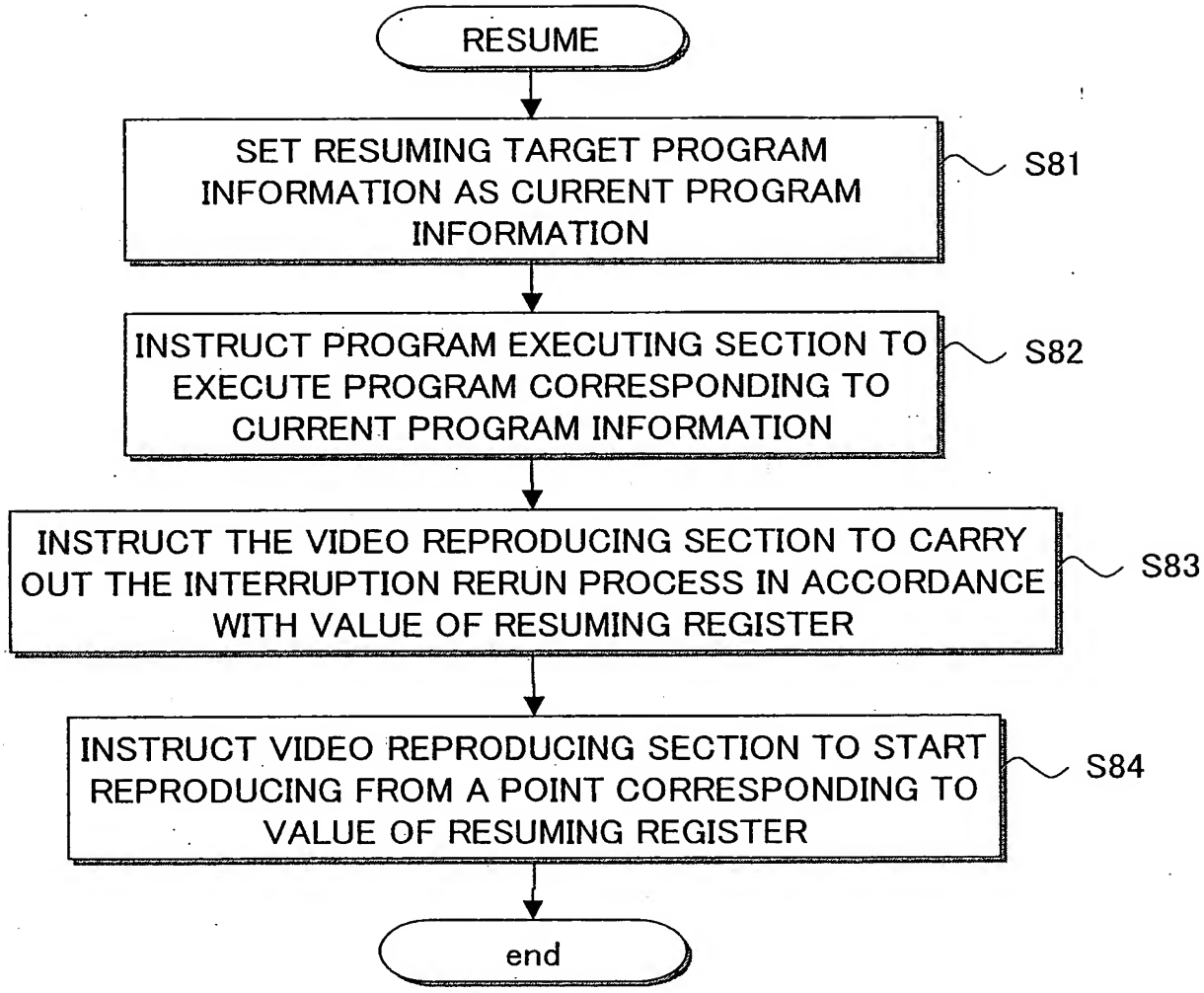

RESUME
SET RESUMING TARGET PROGRAM INFORMATION AS CURRENT PROGRAM INFORMATION
S81
INSTRUCT PROGRAM EXECUTING SECTION TO EXECUTE PROGRAM CORRESPONDING TO CURRENT PROGRAM INFORMATION
S82
INSTRUCT THE VIDEO REPRODUCING SECTION TO CARRY OUT THE INTERRUPTION RERUN PROCESS IN ACCORDANCE WITH VALUE OF RESUMING REGISTER
S83
INSTRUCT VIDEO REPRODUCING SECTION TO START REPRODUCING FROM A POINT CORRESPONDING TO VALUE OF RESUMING REGISTER
S84
end

FIG. 27

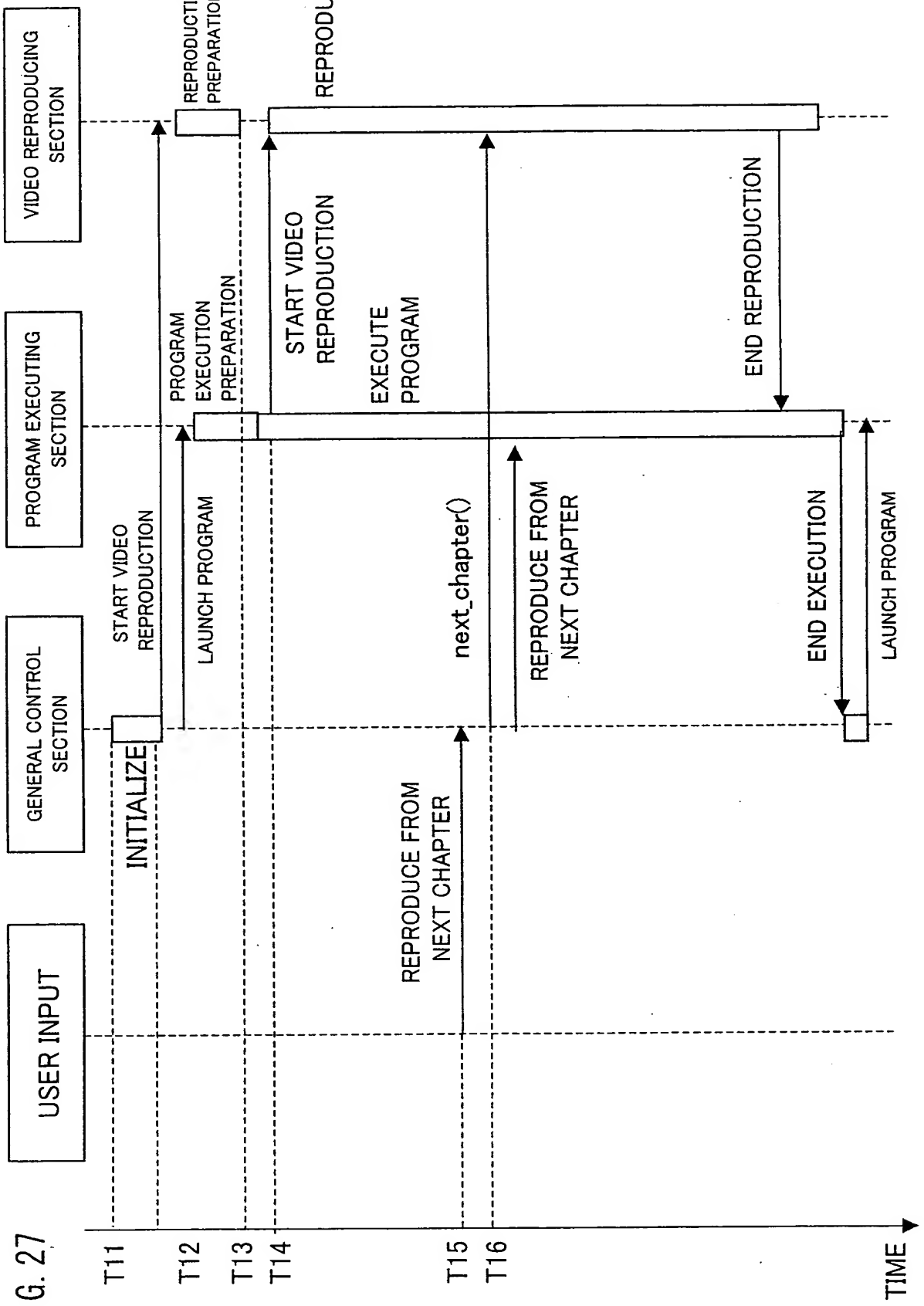
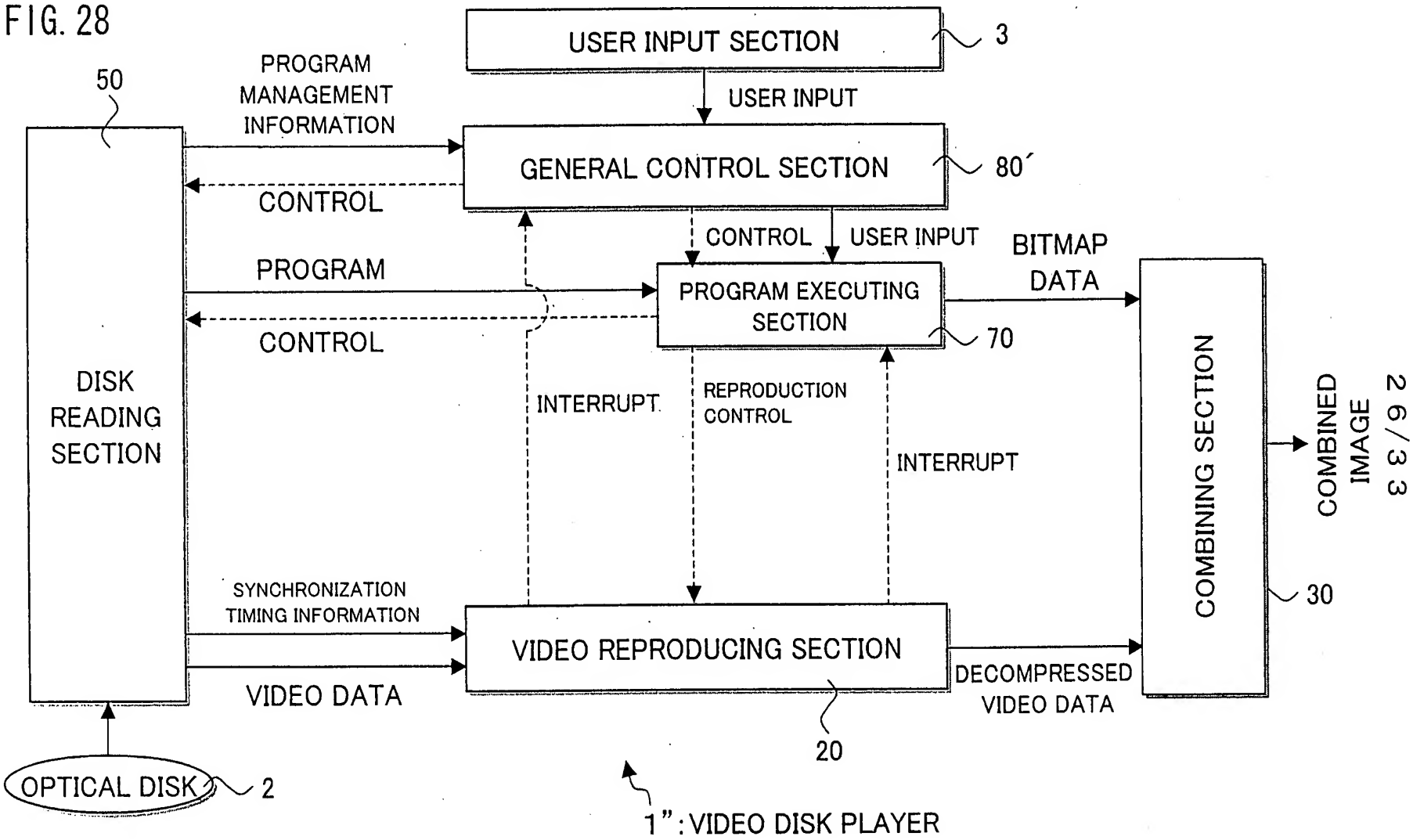

USER INPUT
GENERAL CONTROL SECTION
PROGRAM EXECUTING SECTION
VIDEO REPRODUCING SECTION
INITIALIZE
START VIDEO REPRODUCTION
LAUNCH PROGRAM
PROGRAM EXECUTION PREPARATION
REPRODUCTION PREPARATION
START VIDEO REPRODUCTION
REPRODUCE
EXECUTE PROGRAM
END REPRODUCTION
REPRODUCE FROM NEXT CHAPTER
next_chapter()
REPRODUCE FROM NEXT CHAPTER
END EXECUTION
LAUNCH PROGRAM
T11
T12
T13
T14
T15
T16
TIME

FIG. 28


USER INPUT SECTION
3
50
PROGRAM MANAGEMENT INFORMATION
USER INPUT
GENERAL CONTROL SECTION
80'
CONTROL
CONTROL
USER INPUT
BITMAP DATA
PROGRAM
PROGRAM EXECUTING SECTION
70
CONTROL
DISK READING SECTION
INTERRUPT
REPRODUCTION CONTROL
INTERRUPT
COMBINING SECTION
COMBINED IMAGE
30
SYNCHRONIZATION TIMING INFORMATION
VIDEO REPRODUCING SECTION
VIDEO DATA
DECOMPRESSED VIDEO DATA
20
OPTICAL DISK
2
1": VIDEO DISK PLAYER

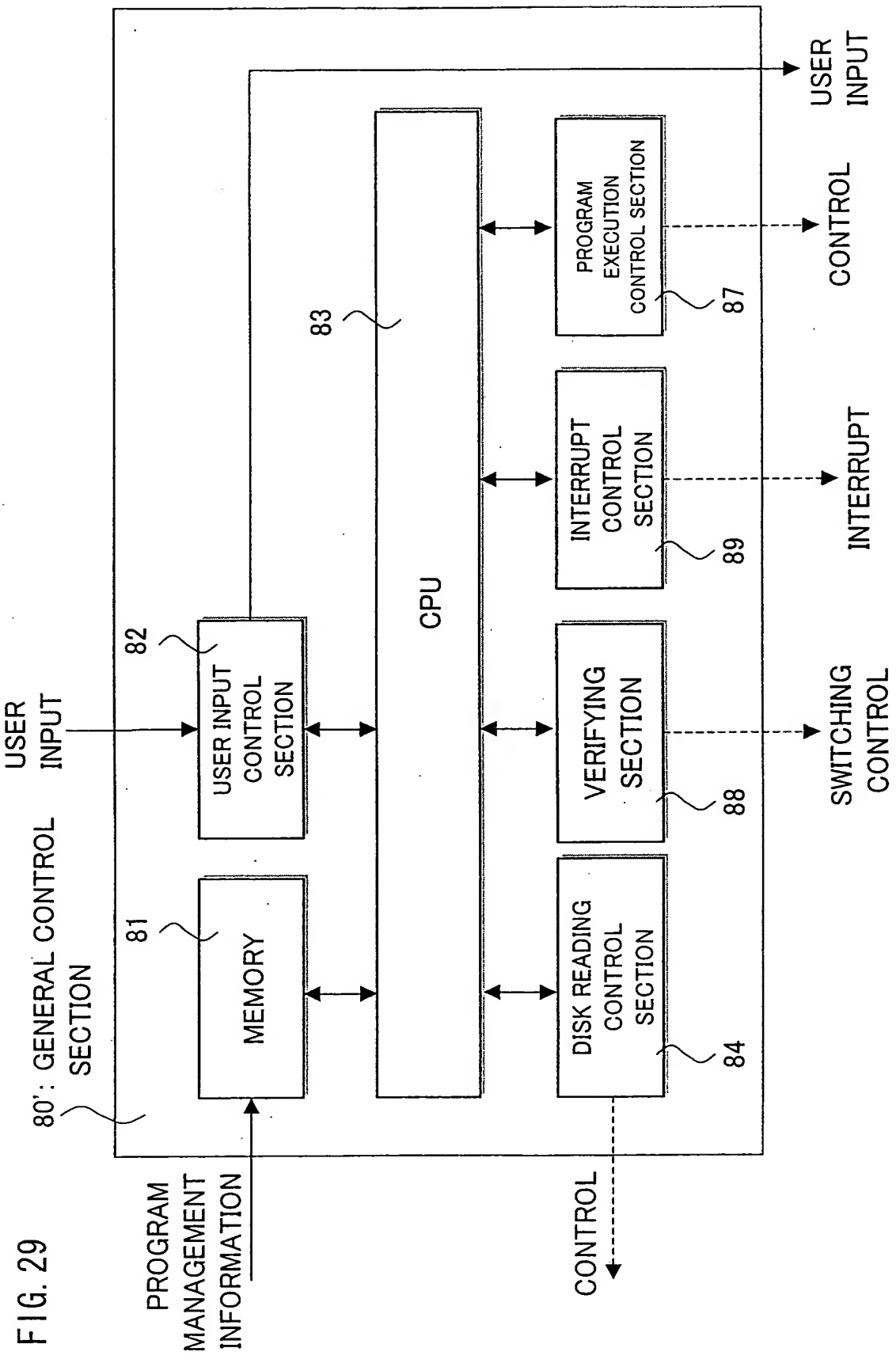

80': GENERAL CONTROL SECTION
USER INPUT
82
USER INPUT CONTROL SECTION
81
MEMORY
CPU
83
PROGRAM EXECUTION CONTROL SECTION
87
INTERRUPT CONTROL SECTION
89
VERIFYING SECTION
88
DISK READING CONTROL SECTION
84
USER INPUT
CONTROL
INTERRUPT
SWITCHING CONTROL
PROGRAM MANAGEMENT INFORMATION
CONTROL

FIG. 29

FIG. 30(a)

```
PROGRAM MANAGEMENT INFORMATION () {
        program_file_name;
        number_of_video_info;
        for (i=0; i < number_of_video_info; i++){
                video_info();
        }
}
```

FIG. 30(b)

```
video_info() {
        video_file_name;
        certificate;
}
```

FIG. 31 (a)

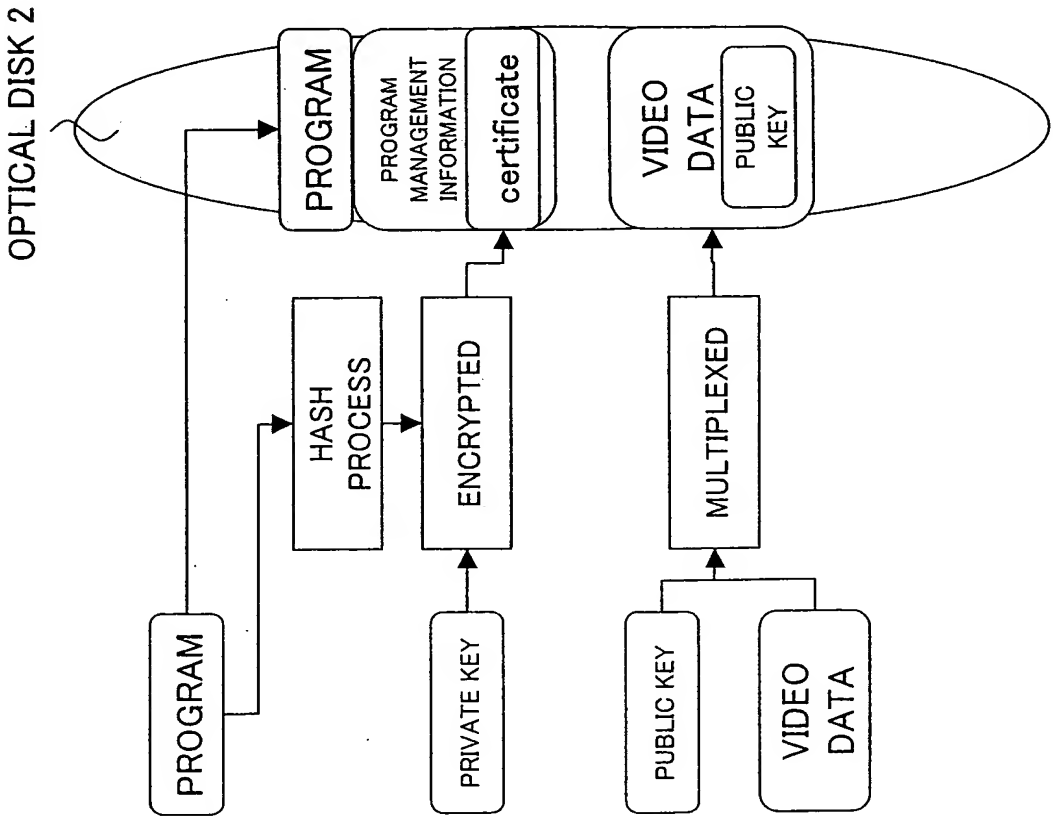


FIG. 31 (b)

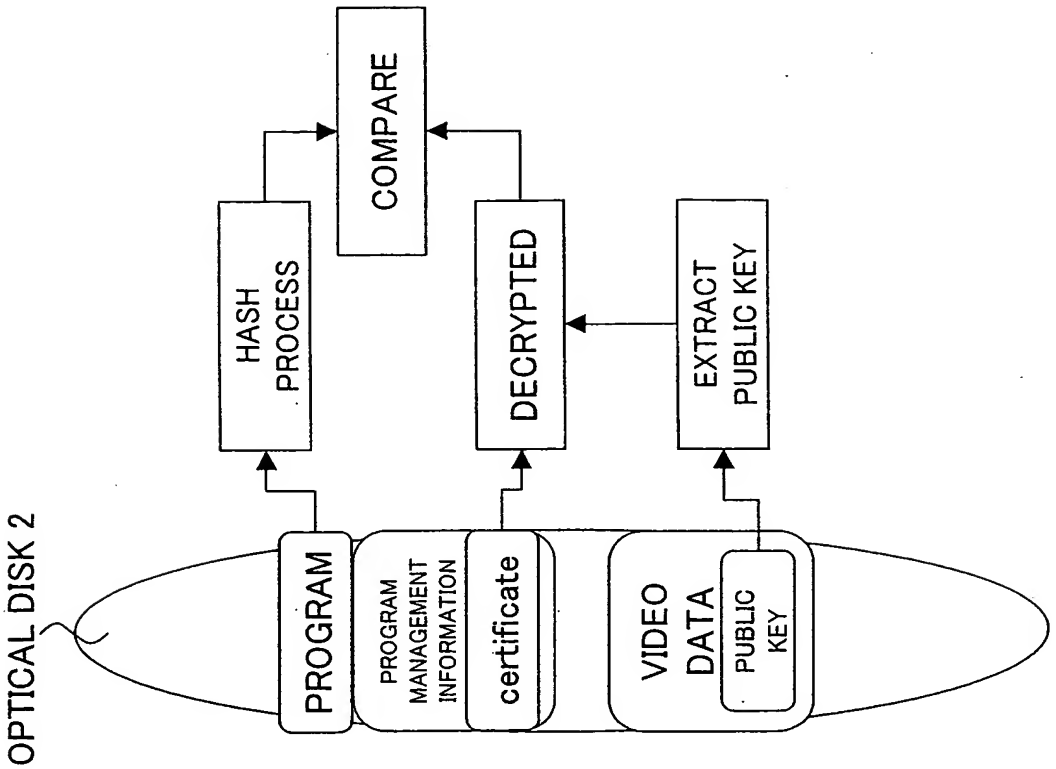


FIG. 32

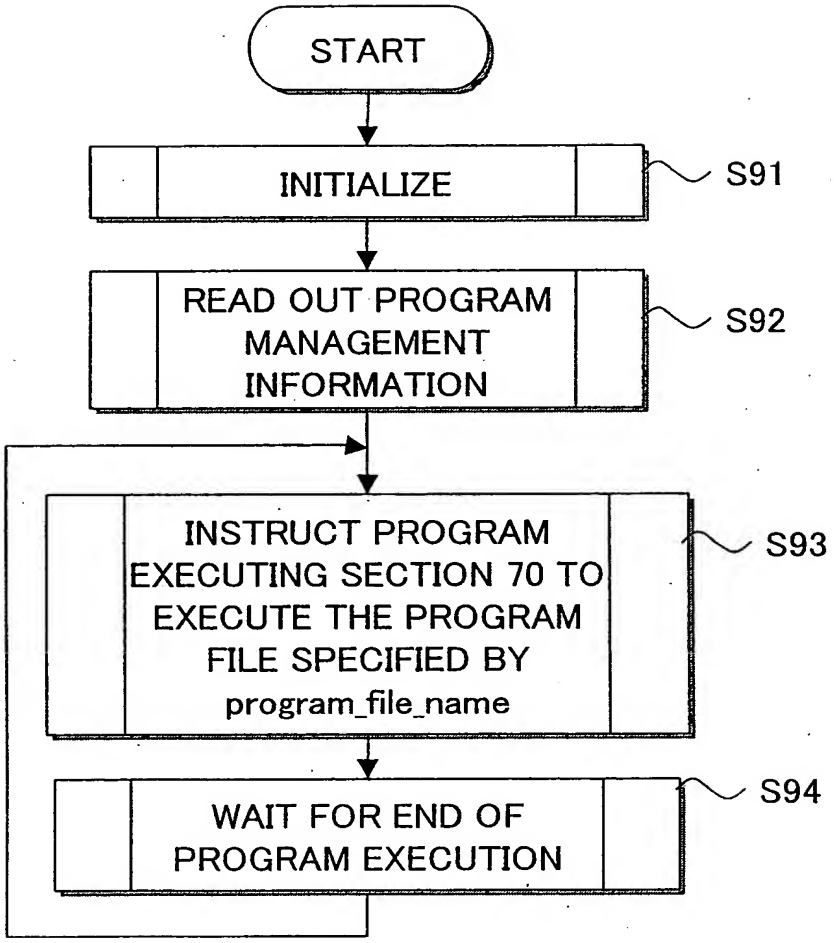

START
INITIALIZE
S91
READ OUT PROGRAM MANAGEMENT INFORMATION
S92
INSTRUCT PROGRAM EXECUTING SECTION 70 TO EXECUTE THE PROGRAM FILE SPECIFIED BY program_file_name
S93
WAIT FOR END OF PROGRAM EXECUTION
S94

FIG. 33

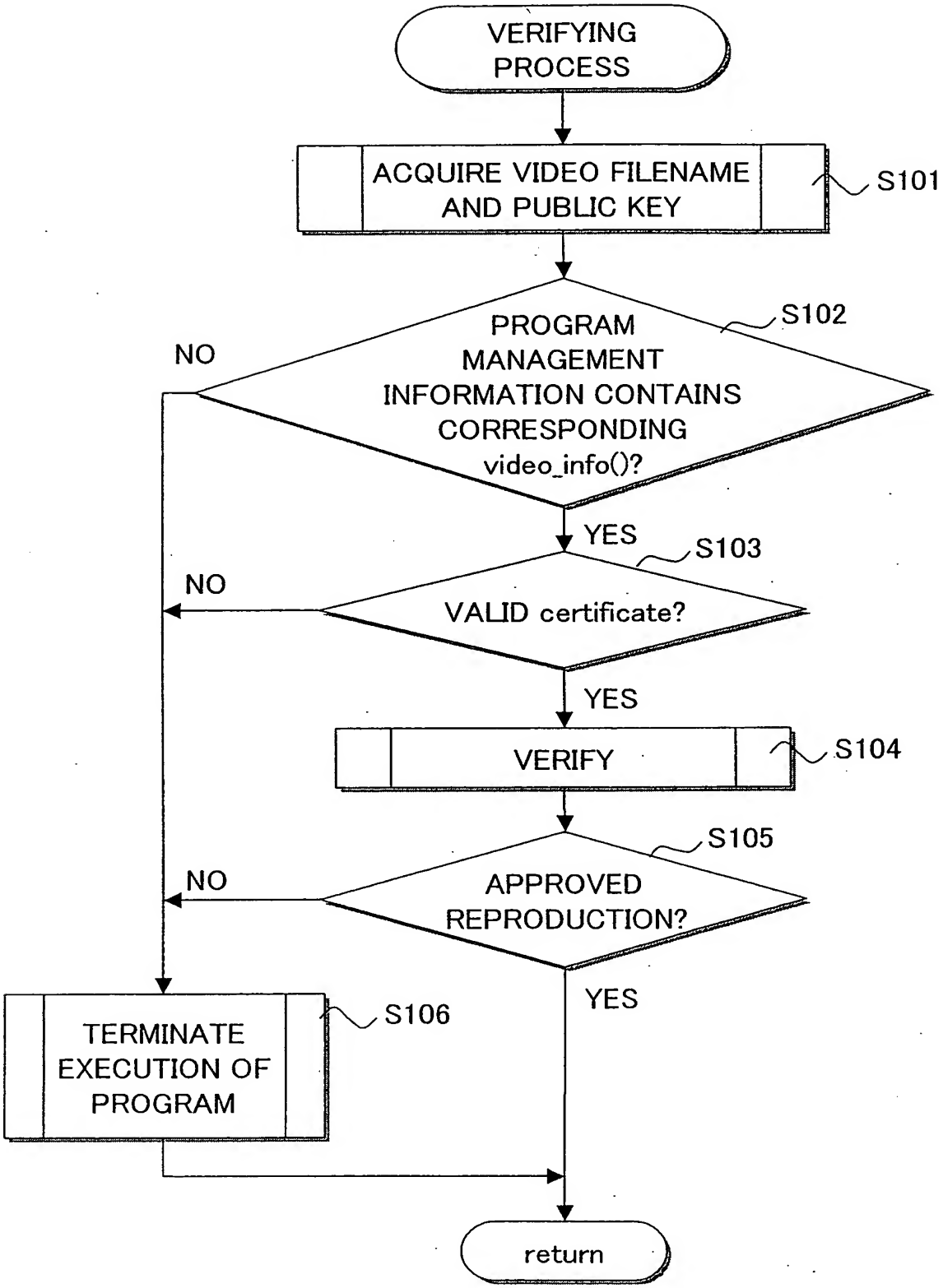

VERIFYING PROCESS
ACQUIRE VIDEO FILENAME AND PUBLIC KEY
S101
PROGRAM MANAGEMENT INFORMATION CONTAINS CORRESPONDING video_info()?
S102
NO
YES
VALID certificate?
S103
NO
YES
VERIFY
S104
APPROVED REPRODUCTION?
S105
NO
YES
TERMINATE EXECUTION OF PROGRAM
S106
return

FIG. 34

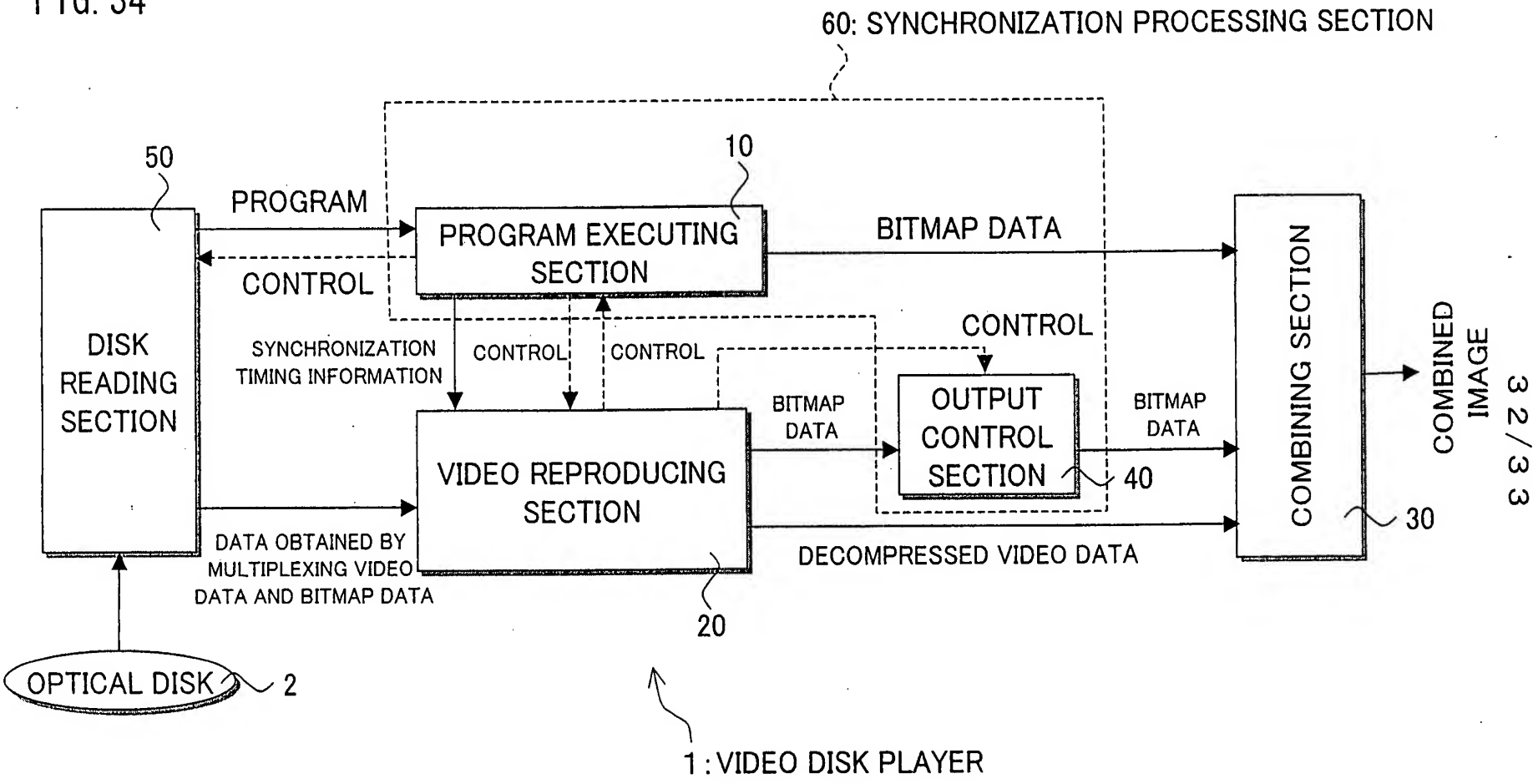
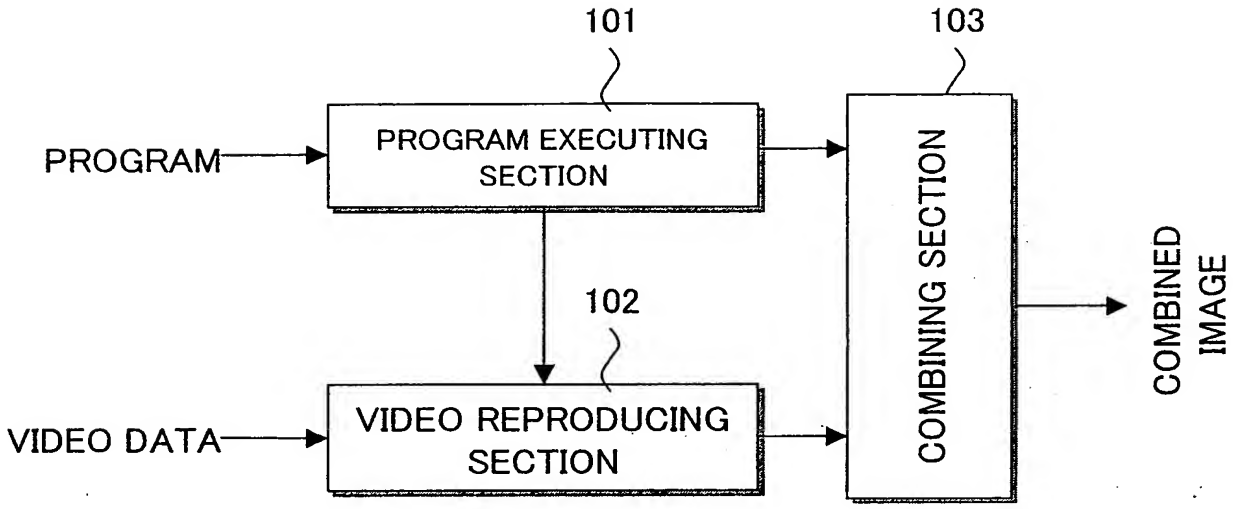

60: SYNCHRONIZATION PROCESSING SECTION
50
10
PROGRAM
CONTROL
PROGRAM EXECUTING SECTION
BITMAP DATA
DISK READING SECTION
SYNCHRONIZATION TIMING INFORMATION
CONTROL
CONTROL
CONTROL
BITMAP DATA
OUTPUT CONTROL SECTION
40
BITMAP DATA
COMBINING SECTION
30
COMBINED IMAGE
32/33
VIDEO REPRODUCING SECTION
DATA OBTAINED BY MULTIPLEXING VIDEO DATA AND BITMAP DATA
DECOMPRESSED VIDEO DATA
20
OPTICAL DISK
2
1 : VIDEO DISK PLAYER

FIG. 35


101
103
PROGRAM
PROGRAM EXECUTING SECTION
102
VIDEO DATA
VIDEO REPRODUCING SECTION
COMBINING SECTION
COMBINED IMAGE